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A KEY TO THE LARVAE OF SOME SPECIES OF HYPERA GERMAR, 1817 (=PHYTONOMUS SCHOENHERR, 1823)

(COLEOPTERA, CURCULIONIDAE)

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Larvae of several of the species of *Hypera* have been described or figured by various authors during the past century, and accounts of life cycles and habits have been published. Some of the principal papers dealing with these subjects are those by Goureau, 1844[1]; Perris, 1851; Heeger, 1851; Laboulbène, 1862; Rosenhauer, 1882; Titus, 1911; Urban, 1923 and 1929; and Servadei, 1944. While the published descriptions contain some of the characters peculiar to larvae of the genus none is complete. Furthermore the distinguishing characters for the species discussed have not been indicated. For this reason it has not been possible to incorporate into the key which follows any reference to species not available for study.

Of the 14 named forms which were studied in the preparation of the present paper, 6 are found in Europe and North America, and 7 are found in Europe but not in North America. The fourteenth species, *Hypera compta* (Say), is recorded from North America only. Identification of nearly all the larvae is based upon that for reared adults by competent systematists. Larvae of all the species studied are in the collection of the United States National Museum, a specimen of *Hypera pedestris* (Payk.) having been kindly given to that collection by Dr. F. van Emden of the Imperial Institute of Entomology, London, England. As will be noted nearly all the specimens received from Europe were collected by J. P. Kryger, Thoreby Gl. Skole, Flintinge, Denmark, and deposited in the United States National Museum through his continuing kindness.

The following diagnosis is believed to be sufficient to distinguish mature (4th stage) larvae of *Hypera* from those of the other genera of Rhynchophora which are known.

[1]See Literature Cited.

Hypera Germar

Larva slender, slightly to strongly curved, rarely straight (in preserved specimens). Eusterna[2] bilobed, forming at least moderately distinct, short ampullae. Head often darkly pigmented, free, as broad as or broader than long. Two pairs of ocelli present, each ocellus convex, distinct. Antenna consisting of one membranous article which bears a conical accessory sensory appendage and several minute setae. Catapophyses in same plane as frons. Frontal suture distinguishable throughout its length, incomplete anteriorly. Endocarina absent. Frons with four, rarely three (*H. rumicis* (L.)) pairs of setae, frontal seta 5 elongate. Anterior margin of labrum with distinct emargination at the middle. Paired lateral and unpaired median sensilla present on labrum. Labral rods present. Epipharynx with four anteromedian setae. Labial palpus with one article. Postmentum with three pairs of setae, the setae of posterior pair separated by a distance equal to one-third or one-fourth that between the middle pair. Maxillary palpus with two articles, the basal article not bearing a free accessory process, the apical article without lateral seta. Mala with five ventral and six dorsal setae. All spiracles bicameral, the air tubes annulated. Spiracular area of mesothorax with three setae, one minute the other two longer, subequal. Alar area of mesothorax and metathorax with two setae. Typical abdominal segments with three dorsal folds (fold III apparently absent in *H. compta*), fold I developed laterally, and five postdorsal setae. Epipleurum of abdominal segments with two setae. Pleurum of abdominal segments with two setae. Eusternum with one very short seta. Sternellum present.

The key which follows is based upon 4th stage larvae only and, except in a few instances, the key characters will not hold for younger larvae. I realize that the difficulties of recognizing the various stages in a population are considerable. In most infestations, however, all stages may occur together and larvae making a pupil cell or already within the cell will be mature. The width of the head of 4th stage larvae of the various species has been incorporated into the key. These measurements will be of only slight value in differentiating the species but may help to make 4th stage larvae recognizable as such.

The available larvae seem to fall into four natural groups, although *arundinis* (Payk.) is rather distinct and may represent a fifth group. The first of these groups contains eight species which in turn represent two subgroups, the first subgroup including *nigrirostris* (F.), *trilineata* (Marsh.) and *meles* (F.), the second subgroup including *pedestris* (Payk.), *plantaginis* (Deg.), *transsylvanica* (Petri), *postica* (Gyll.) and *brunneipennis* (Boh.). The second group of species is

[2]For an explanation of this and other terms employed in the description and key see Anderson, 1947.

represented by *punctata* (F.). The third group includes *rumicis* (L.) and *compta* (Say). The fourth includes *arator* (L.), *arundinis* (Payk.) and *adspersa* (F.). For the most part these groupings agree with those found in the comprehensive study, based upon the adults, published by Petri, 1901. Judging from that classification of the adults it appears that larvae of three of the species which are available for study are incorrectly placed. Petri places *nigrirostris*, *pedestris* and *arator* in three separate groups each different from those indicated by the larvae. It is quite possible that as larvae of more species become available for study it will be found that the characters, by which each of the above-mentioned three species is separated, are common to unrepresented species. In that case the classification of the adults will be more closely borne out by that of the larvae.

The species which have been most difficult to separate in the following key are *pedestris*, *plantaginis*, *transsylvanica*, *postica* and *brunneipennis*. The principal differences found lie in the comparative length and shape of setae on various parts of the body. Characters of a comparative nature are unsatisfactory at best, but it is hoped that by the use of the accompanying illustrations my meaning will be understood.

Key to the Species

1. Principal dorsal setae on abdomen cylindrical to club shaped, short (figs. 9, 22-25); head capsule orange anteriorly, brown or mottled posteriorly (often nearly completely orange in *nigrirostris*); (abdomen not distinctly darker dorsally than ventrally) 2

   Principal dorsal setae on abdomen cylindrical to attenuate, not enlarged apically, usually elongate (figs. 3-5, 8); head capsule brown to dark brown, without transverse orange band anteriorly; (abdomen often distinctly darker dorsally than ventrally) 8

2. Frons smoothly convex; mandible with two apical teeth (fig. 6) 3

   Frons with broad, blunt projection anteriorly; mandible with four apical teeth (fig. 7). Head width: 1.17 to 1.25 mm. *punctata* (Fabricius)

3. Dorsal area of prothorax not covered with asperities, an appreciable shiny sclerite present; frontal setae 1 and 2 very short to minute, usually one-third or less than one-third as long as seta 4 (fig. 13) 4

   Dorsal area of prothorax covered with blunt asperities, an appreciable sclerite absent; frontal setae 1 and 2 short to moderately long, usually two-thirds as long as seta 4 (fig. 12) 5

4. Head capsule orange, usually with a narrow infuscated band along margin of occipital foramen and one along epicranial suture; typical abdominal segments with postdorsal seta 2 very short, not more than one-third as long as seta 3 (fig. 29). Head width (*nigrirostris*): 0.52 to 0.55 mm.

trilineata (Marsham) and *nigrirostris* (Fabricius)[3]

Posterior half of head capsule brown; typical abdominal segments with postdorsal seta 2 longer, more than one-half as long as seta 3 (fig. 30). Head width: 0.56 mm.

meles (Fabricius)

5. Principal dorsal setae on body lightly but distinctly pigmented; prodorsal setae on typical abdominal segments slender (fig. 27), the length of each not greater than that of spiracle on the same segment (fig. 28). Head width 0.77 mm.

pedestris (Paykull)

Principal dorsal setae on body not pigmented; prodorsal setae on typical abdominal segments stouter (figs. 23-25), the length of each greater (as much as twice as great) than that of spiracle on same segment (figs. 25, 26). Head width: 0.55 to 0.63 mm. 6

6. The three most dorsal setae on pronotum either cylindrical or slightly to distinctly enlarged apically (fig. 2); postdorsal seta 2 on abdominal segments V and VI distinctly clubbed (figs. 16-19) 7

The three most dorsal setae on pronotum attenuate although some may be blunt (fig. 1); postdorsal seta 2 on abdominal segments V and VI slender, not or scarcely enlarged apically (figs. 20, 21). Head width: 0.55 to 0.62 mm.

brunneipennis (Boheman) and *postica* (Gyllenhal)

7. Postdorsal seta 3 on abdominal segments V (fig. 16) and VI (fig. 17) more slender than and approximately twice as long as seta 2 (figs. 16, 17). Head width: 0.63 to 0.65 mm.

plantaginis (Degeer)

Postdorsal seta 3 on abdominal segments V (fig. 18) and VI (fig. 19) not more slender nor appreciably longer than seta 2 (figs. 18, 19). Head width: 0.61 mm. *transsylvanica* (Petri)

8. Head capsule with fine dorsal and lateral granulations; abdominal segments distinctly darker above epipleura than below; posterior half of each abdominal pleurum, behind longer seta, without asperities 9

Head capsule without granulations; abdominal segments only slightly or not darker above epipleura than below; posterior half of each abdominal pleurum, behind longer seta, with pigmented asperities 10

[3]For a possible means of separating 3rd stage larvae of these two species see below under *trilineata*.

9. Frons with three pairs of setae (fig. 15); pronotum nearly uniformly covered with blunt asperities; dorsal fold III distinct on typical abdominal segments. Head width: 0.81 to 0.85 mm. ..... *rumicis* (Linnaeus)

Frons with four pairs of setae (fig. 14); pronotum with a shiny, pigmented sclerite which is not covered with asperities; dorsal fold III apparently absent on typical abdominal segments. Head width: 0.65 mm. ..... *compta* (Say)

10. Pigmented tubercles from which postdorsal setae 2 and 3 arise, on typical abdominal segments, adjacent or fused, not separated by as much as one-half the diameter of either tubercle; typical abdominal segments with postdorsal setae 2 and 4 distinctly in front of a line connecting setae 1, 3 and 5; principal dorsal body setae long (fig. 3). Head width: 0.72 to 0.75 mm. ..... *arator* (Linnaeus)

Pigmented tubercles from which postdorsal setae 2 and 3 arise, on typical abdominal segments, separated by more than the diameter of either tubercle; typical abdominal segments with postdorsal setae 2 and 4 only slightly or not at all in front of a line connecting setae 1, 3 and 5; principal body setae short (fig. 5). 11

11. Abdominal segments with oval, distinctly pigmented area immediately above and behind spiracle. Head width: 1.0 mm. *arundinis* (Paykull)

Abdominal segments without oval, pigmented area above and behind spiracle. Head width: 0.82 ..... *adspersa* (Fabricius)

Hypera nigrirostris (Fabricius), the lesser clover leaf weevil

Specimens from North America were collected at Bellingham, Wash., St. Helens and Portland, Ore., and Alton, Calif. The larvae attack clover, one series from Oregon being taken in young flower heads and buds. Specimens from Europe bear the data: Bovsierg, Denmark, August 4, 1946, *Trifolium fragiferum* L., J. P. Kryger.

Hypera trilineata (Marsham)

Specimens studied bear the data: Lemvig Fjord (Denmark), July 12, 1938, in flowers and green fruits of *Anthyllis vulneraria* L., H. P. S. Sönderup.

This material (received through J. P. Kryger) consists of several third-stage larvae, pupae in pupal cases together with cast (fourth-stage) larval skins, and reared adults. The cast larval skins have been mounted on slides but these preparations are not satisfactory for careful study and comparison with well-preserved fourth-stage larvae of *nigrirostris*. At

the present time no significant differences have been found which will separate fourth-stage larvae of *trilineata* from the corresponding stage of *nigrirostris*. However, there seems to be a significant difference in the comparative lengths of the postdorsal setae in third-stage larvae of the material identified as these two species. These differences may be expressed as follows:

Typical abdominal segments with postdorsal setae 1, 2, 4 and 5 minute, scarcely one-fifth as long as seta 3 (fig. 10) *nigrirostris* (Fabricius)

Typical abdominal segments with postdorsal setae 1, 2, 4 and 5 short, one-half or more than one-half as long as seta 3 (fig. 11) ..... *trilineata* (Marsham)

Hypera meles (Fabricius)

Specimens studied bear the data: Gedser, Denmark, July 21, 1946, *Trifolium arvense*, J. P. Kryger. This species is present in the United States but no larvae from this country are present in the collection of the United States National Museum.

Hypera pedestris (Paykull)

Specimens studied bear the data: Schönebeck a. d. Elbe, July 1914, C. Urban.

Hypera plantaginis (Degeer)

Specimens studied bear the data: Flintinge Byskov, Lolland, Denmark, July 12, 1942, *Lotus*, J. P. Kryger. A second series of specimens received from Kryger, and reported by Kryger and Sönderup (1940, p. 103) as *Phytonomus trilineatus*, was taken at Grönholt, Denmark, June 23, 1940, in flowers of *Lotus* and *Anthyllis*. I have reidentified those specimens, on the basis of larvae only, as *H. plantaginis*.

Hypera transsylvanica (Petri)

The single larva and a cast larval skin were received with the Hajoss collection of European weevils, November 6, 1929. No data accompany the specimens.

Hypera postica (Gyllenhal), the alfalfa weevil

Numerous larvae are available for study, most of them collected at Salt Lake City, Utah, 1939, on alfalfa, received from J. Hamlin.

Hypera brunneipennis (Boheman)

Careful comparative studies of a series of specimens identified as *Hypera brunneipennis*, collected at Yuma, Ariz.,

March-April, 1940, by W. C. McDuffie, have failed to indicate any consistent differences by which larvae of *brunneipennis* may be separated from those of *postica*.

Hypera punctata (Fabricius), the clover leaf weevil

Numerous larvae are available for study, collected in various parts of the United States.

It should be noted that larvae of *Listroderes obliquus* Klug and *L. apicalis* Waterhouse resemble those of *H. punctata*. The characteristics of the mandibles and frons as well as the number of setae on frons and on abdominal segment VIII will serve to distinguish larvae of *H. punctata* from those of *Listroderes*.

Hypera rumicis (Linnaeus)

Specimens studied bear the data: New Jersey Interstate Park, June 30, 1930, on *Rumex*, J. C. Bridwell; Ravenkilde, Rebild, Jutland, Denmark, July 14, 1917, on *Rumex*, J. P. Kryger; Holmegaards Mose (Denmark) July 9, 1939, *Rumex hydrolapathum*, J. P. Kryger.

Hypera compta (Say)

Specimens studied bear the data: Havana, Ill., April 30, 1898, on *Polygonum;* Canada, June 6, 1922, on *Polygonum;* Priest Bridge, Md., May 21, 1939, and June 2, 1940, on *Polygonum*, W. H. Anderson.

Hypera arator (Linnaeus)

Specimens studied bear the data: Tibirke, Seeland, Denmark, July 7, 1918, on *Spergula sativa*, J. P. Kryger, Bötö By, Denmark, August 17, 1942, *Spergula arvensis*, J. P. Kryger.

Hypera arundinis (Paykull)

Specimens studied bear the data: Virum Mose, Seeland, Denmark, July 16, 1894, E. Rosenberg; Huseö Mose, Denmark, August 13, 1940, *Phellandrium*, J. P. Kryger.

Hypera adspersa (Fabricius)

Specimens studied bear the data: Maribo Sö, Denmark, July 18, 1913, in stems of *Phellandrium*, J. P. Kryger; Alleröd Sö, Denmark, August 12, 1939, *Phellandrium*, J. P. Kryger.

Explanation of Figures

All figures drawn by author, with the aid of a camera lucida (except figures 8 and 9).

Fig. 1. *Hypera postica,* three most dorsal setae on pronotum, × 130.

Fig. 2. *H. transsylvanica,* three most dorsal setae on pronotum, × 130.

Fig. 3. *H. arator,* prodorsal seta, abdominal segment II, × 60.

Fig. 4. *H. rumicis,* prodorsal seta, abdominal segment II, × 60.

Fig. 5. *H. arundinis,* prodorsal seta, abdominal segment II, × 60.

Fig. 6. *H. rumicis,* left mandible, × 60.

Fig. 7. *H. punctata,* left mandible, × 60.

Fig. 8. *H. compta,* abdominal segment II, × 12.

Fig. 9. *H. punctata,* abdominal segment II, × 10.

Fig. 10. *H. nigrirostris,* postdorsal setae, abdominal segment II (third-stage larva), × 260.

Fig. 11. *H. trilineata,* postdorsal setae, abdominal segment II (third-stage larva), × 260.

Fig. 12. *H. postica,* frons, × 40.

Fig. 13. *H. nigrirostris,* frons, × 40.

Fig. 14. *H. compta,* frons, × 40.

Fig. 15. *H. rumicis,* frons, × 40.

Fig. 16. *H. plantaginis,* postdorsal setae 1, 2 and 3, abdominal segment V, × 60.

Fig. 17. *H. plantaginis,* postdorsal setae 1, 2 and 3, abdominal segment VI, × 60.

Fig. 18. *H. transsylvanica,* postdorsal setae 1, 2 and 3, abdominal segment V, × 60.

Fig. 19. *H. transsylvanica,* postdorsal setae 1, 2 and 3, abdominal segment VI, × 60.

Fig 20. *H. postica,* postdorsal setae 1, 2 and 3, abdominal segment V, × 60.

Fig. 21. *H. postica,* postdorsal setae 1, 2 and 3, abdominal segment VI, × 60.

Fig. 22. *H. punctata,* prodorsal seta, abdominal segment III, × 130.

Fig. 23. *H. transsylvanica,* prodorsal seta, abdominal segment III, × 130.

Fig. 24. *H. postica,* prodorsal seta, abdominal segment II, × 130.

Fig. 25. *H. plantaginis,* prodorsal seta, abdominal segment II, × 130.

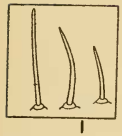
Fig. 26. *H. plantaginis,* spiracle, abdominal segment II, × 130.

Fig. 27. *H. pedestris,* prodorsal seta, abdominal segment II, × 130.

Fig. 28. *H. pedestris,* spiracle, abdominal segment II, × 130.

Fig. 29. *H. nigrirostris,* postdorsal setae 1, 2 and 3, abdominal segment II, × 130.

Fig. 30. *H. meles,* postdorsal setae 1, 2 and 3, abdominal segment II, × 130.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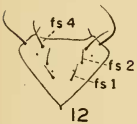
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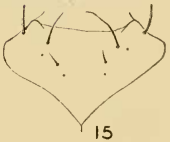
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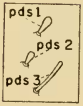
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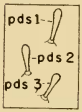
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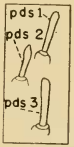
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HYPERA

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DISTRIBUTION OF BALDULUS MAIDIS (DE LONG AND WOLCOTT)

(HOMOPTERA, CICADELLIDAE)

Baldulus maidis, described in the genus *Cicadula* from Puerto Rican material, has been recorded at times as a serious pest of young corn. Records from Argentina indicate that it also attacks sugar beets. Following are the available distribution records: UNITED STATES—Arizona (Patagonia, Sedona, Tucson); California (Alhambra, Colton, Temple); Florida (Sanford); North Carolina (Raleigh); Texas (McAllen, Nueces County, Richland Springs); CUBA: PUERTO RICO: DOMINICAN REPUBLIC: MEXICO (Monoclova); COSTA RICA (San Pedro de Montes de Oca); VENEZUELA (El Valle); BRAZIL (Campinas, Viscosa); PERU (Cañete); ARGENTINA (Tucuman).

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